What is claimed is:

1.   A base station apparatus comprising:

a scheduler that determines a schedule to transmit transmission data to communication terminal apparatuses based on communication quality for subcarrier blocks obtained by dividing a multicarrier communication band into a plurality of portions;

a subcarrier block selection section that arranges transmission data in subcarrier blocks whose communication quality is equal to or higher than predetermined quality for the respective communication terminal apparatuses;   .

a frequency hopping section that subjects transmission data to frequency hopping in predetermined time units· and arranges the transmission data in subcarriers in the subcarrier blocks; and

a transmission section that transmits the transmission data arranged in the subcarriers.

2.   The base station apparatus according to claim 1, wherein said subcarrier block selection section subjects the subcarrier blocks to hopping in predetermined time units.

3.   A communication terminal apparatus comprising:

a subcarrier block extraction section that separates a received signal into subcarrier blocks obtained by dividing a multicarrier communication band

into a plurality of portions;

a reproduction section that reproduces a received signal subjected to hopping within the subcarrier blocks;

a CIR measuring section that measures a CIR of the 5 received signal;

a CQI generation section that generates CQI indicating a transmission rate requested based on said CQI; and

a transmission section that transmits said CQI.

10

4.   The communication terminal apparatus according to claim 3, wherein said CIR measuring section comprises:

a signal power calculation section that calculates power of desired signals from the received signal in 15 subcarrier block units;

an interference power calculation section that calculates power of interference signals from the received signal in subcarrier block units;

an averaging section that calculates an average 20 value of power of interference signals in a plurality of subcarrier blocks; and

a CIR calculation section that calculates a CIR from power values of said desired signals and average power value of said interference signals in subcarrier block 25 units.

5.   A radio communication method comprising the steps of:

determining a schedule for transmitting transmission data to a plurality of communication terminal apparatuses based on CQI transmitted from the respective communication terminal apparatuses;

5   calculating communication quality for the communication terminal apparatuses in units of subcarrier blocks obtained by dividing a multicarrier communication band into a plurality of portions, arranging transmission data in subcarrier blocks whose communication quality

10 is equal to or higher than predetermined quality for the respective communication terminal apparatuses;

arranging the transmission data subjected to frequency hopping in predetermined time units in subcarriers in the subcarrier blocks and transmitting

15 the transmission data arranged in the subcarriers;

separating the received signal into subcarrier blocks obtained by dividing a multicarrier communication band into a plurality of portions;

reproducing the received signal subjected to hopping

20 in the subcarrier blocks; and

measuring a CIR of the received signal, generating CQI indicating a transmission rate requested based on said CIR and transmitting said CQI.

ABSTRACT

In order to reduce interference between cells
through hopping and use frequencies in a good propagation
situation, a scheduler section 102 carries out scheduling
5   for determining to which user data should be sent using
CQI from each communication terminal apparatus, selects
a user signal to be sent in the next frame and determines
in which subcarrier block the data should be sent. An
MCS decision section 103 selects a modulation scheme and
10   coding method from the CQI of the selected user signal.
A subcarrier block selection section 110 selects a
subcarrier block instructed by the scheduler section 102
for each user signal. For the respective subcarrier
blocks, FH sequence selection sections 111-1 to 111-n
15   select hopping patterns. A subcarrier mapping section
112 maps the user signal and control data to subcarriers
according to the selected hopping pattern.

[FIG.1]

TRANSMISSION DATA (USER 1)

TRANSMISSION DATA (USER 2)

TRANSMISSION DATA (USER 3)

5   CQI FROM MOBILE STATION

11   SCHEDULER SECTION

12   CODING SECTION

13   TRANSMISSION HARQ SECTION

14   MODULATION SECTION

10   CONTROL DATA

15   CONTROL DATA PROCESSING SECTION

16   CODING SECTION

17   MODULATION SECTION

FH PATTERN

15   18   MULTIPLEXING SECTION

19   SUBCARRIER MAPPING SECTION

PILOT SIGNAL

20   S/P CONVERSION SECTION

21   IFFT SECTION

20   22   GI INSERTION SECTION

23   RADIO PROCESSING SECTION

[FIG.2]

RM PARAMETER

25   21   BUFFER

22   RATE MATCHING

[FIG.3]

1 BLOCK (= N SUBCARRIERS)

FREQUENCY

TIME (SYMBOL)

PILOT

5 DATA

[FIG.4]

51 RADIO PROCESSING SECTION

52 GI ELIMINATION SECTION

10 53 FFT SECTION

FH PATTERN

54 SUBCARRIER DEMAPPING SECTION

55 CHANNEL SEPARATION SECTION

56 DEMODULATION SECTION

15 57 DECODING SECTION

CONTROL DATA

58 DEMODULATION SECTION

59 RECEPTION HARQ SECTION

60 DECODING SECTION

20 USER DATA

62 CIR MEASURING SECTION

64 TRANSMISSION SECTION

63 CQI GENERATION SECTION

61 ACK/NACK GENERATION SECTION

25

[FIG.5]

TRANSMISSION DATA (USER 1)

TRANSMISSION DATA (USER 2)

TRANSMISSION DATA (USER 3)

102   SCHEDULER SECTION

101   RECEPTION SECTION

103   MCS DECISION SECTION

5   MCS INFORMATION

104-1   CODING SECTION

104-2   CODING SECTION

105-1   TRANSMISSION HARQ SECTION

105-2   TRANSMISSION HARQ SECTION

10   106-1   MODULATION SECTION

106-2   MODULATION SECTION

SUBCARRIER BLOCK INFORMATION

CONTROL DATA

108   CODING SECTION

15   109   MODULATION SECTION

107   CONTROL DATA PROCESSING SECTION

110   SUBCARRIER BLOCK SELECTION SECTION

FH SEQUENCE

111-1   FH SEQUENCE SELECTION SECTION

20   111-2   FH SEQUENCE SELECTION SECTION

111-n   FH SEQUENCE SELECTION SECTION

PILOT SIGNAL

112   SUBCARRIER MAPPING SECTION

113   S/P CONVERSION SECTION

25   114   IFFT SECTION

115   GI INSERTION SECTION

116   RADIO PROCESSING SECTION

[FIG.6]

SUBCARRIER BLOCK

FREQUENCY

1 FRAME

5   ASSIGNMENT TO USER 1

ASSIGNMENT TO USER 2

ASSIGNMENT TO CONTROL DATA

[FIG.7]

10 201 RADIO PROCESSING SECTION

202 GI ELIMINATION SECTION

203 FFT SECTION

SUBCARRIER BLOCK ASSIGNMENT INFORMATION

204 SUBCARRIER BLOCK EXTRACTION SECTION

15 FH SEQUENCE ASSIGNMENT INFORMATION

205-1 DATA SEQUENCE REPRODUCTION SECTION

205-2 DATA SEQUENCE REPRODUCTION SECTION

206-1 DEMODULATION SECTION

206-2 DEMODULATION SECTION

20 207 DECODING SECTION

CONTROL DATA

208 RECEPTION HAPQ SECTION

209 DECODING SECTION

211 PILOT SIGNAL EXTRACTION SECTION

25 212 CIR MEASURING SECTION

214 TRANSMISSION SECTION

213 CQI GENERATION SECTION

210 ACK/NACK GENERATION SECTION

USER DATA

CRC RESULT

[FIG.8]

5   EACH BLOCK PILOT SIGNAL

CALCULATION UNIT FOR EACH BLOCK

301-1 SIGNAL POWER CALCULATION SECTION

302-1 INTERFERENCE POWER CALCULATION SECTION

303-1 CIR CALCULATION SECTION

10 301-2 SIGNAL POWER CALCULATION SECTION

302-1 INTERFERENCE POWER CALCULATION SECTION

303-2 CIR CALCULATION SECTION

301-3 SIGNAL POWER CALCULATION SECTION

302-3 INTERFERENCE POWER CALCULATION SECTION

15 303-3 CIR CALCULATION SECTION

BLOCK 1 CIR

BLOCK 2 CIR

BLOCK 3 CIR

20 [FIG.9]

TRANSMISSION DATA (USER 1)

TRANSMISSION DATA (USER 2)

TRANSMISSION DATA (USER 3)

102 SCHEDULER SECTION

25 101 RECEPTION SECTION

103 MCS DECISION SECTION

104-1 CODING SECTION

104-2 CODING SECTION

MCS INFORMATION

105-1 TRANSMISSION HARQ SECTION

105-2 TRANSMISSION HARQ SECTION

106-1 MODULATION SECTION

5 106-2 MODULATION SECTION

SUBCARRIER BLOCK INFORMATION

CONTROL DATA (SPEECH DATA)

411 CODING SECTION

412 MODULATION SECTION

10 401 CONTROL DATA PROCESSING SECTION

403 SUBCARRIER BLOCK HOPPING SEQUENCE GENERATION

SECTION

402 SUBCARRIER BLOCK SELECTION SECTION

FH SEQUENCE

15 111-1 FH SEQUENCE SELECTION SECTION

111-2 FH SEQUENCE SELECTION SECTION

111-n FH SEQUENCE SELECTION SECTION

PILOT SIGNAL

112 SUBCARRIER MAPPING SECTION

20 113 S/P CONVERSION SECTION

114 IFFT SECTION

115 GI INSERTION SECTION

116 RADIO PROCESSING SECTION

25 [FIG.10]

SUBCARRIER BLOCK

SUBCARRIER BLOCK HOPPING FOR CONTROL DATA

FREQUENCY

1 FRAME

ASSIGNMENT TO USER 1

ASSIGNMENT TO USER 2

ASSIGNMENT TO CONTROL DATA

5

[FIG.11]

PILOT SIGNAL FOR EACH BLOCK

CALCULATION UNIT FOR EACH BLOCK

301-1 SIGNAL POWER CALCULATION SECTION

10 302-1 INTERFERENCE POWER CALCULATION SECTION

301-2 SIGNAL POWER CALCULATION SECTION

302-1 INTERFERENCE POWER CALCULATION SECTION

301-3 SIGNAL POWER CALCULATION SECTION

302-3 INTERFERENCE POWER CALCULATION SECTION

15 601 INTERFERENCE POWER AVERAGING SECTION

602-1 CIR CALCULATION SECTION

602-2 CIR CALCULATION SECTION

602-3 CIR CALCULATION SECTION

BLOCK 1 CIR

20 BLOCK 2 CIR

BLOCK 3 CIR

[FIG.12]

FADING POWER

25 OPERATING FREQUENCY BAND

[FIG.13]

FADING POWER

OPERATING FREQUENCY BAND

[FIG.14]

1 BLOCK

5   1 BLOCK

CELL A

CELL B

CELL C

BLOCK SIZE INFORMATION

10   1 BLOCK

CONTROL STATION

[FIG.15]

   851   DELAY INFORMATION RECEPTION SECTION

15   852   BLOCK SIZE DETERMINING SECTION

   853   TRANSMISSION SECTION

   802   DELAY VARIANCE CALCULATION SECTION

   803   BLOCK SIZE INFORMATION RECEPTION SECTION

   801   RECEPTION SECTION

20   TRANSMISSION DATA (USER 1)

   TRANSMISSION DATA (USER 2)

   TRANSMISSION DATA (USER 3)

   804   SCHEDULER SECTION

   103   MCS DECISION SECTION

25   104-1   CODING SECTION

   104-2   CODING SECTION

   MCS INFORMATION

   105-1   TRANSMISSION HARQ SECTION

105-2   TRANSMISSION HARQ SECTION

106-1   MODULATION SECTION

106-2   MODULATION SECTION

805   SUBCARRIER BLOCK SELECTION SECTION

5   FH SEQUENCE

111-1   FH SEQUENCE SELECTION SECTION

111-2   FH SEQUENCE SELECTION SECTION

111-n   FH SEQUENCE SELECTION SECTION

112   SUBCARRIER MAPPING SECTION

10   SUBCARRIER BLOCK INFORMATION

CONTROL DATA

108   CODING SECTION

109   MODULATION SECTION

107   CONTROL DATA PROCESSING SECTION

15   PILOT SIGNAL

113   S/P CONVERSION SECTION

114   IFFT SECTION

115   GI INSERTION SECTION

116   RADIO PROCESSING SECTION